HealthCare

CSO Customer Support Operations

Maintenance

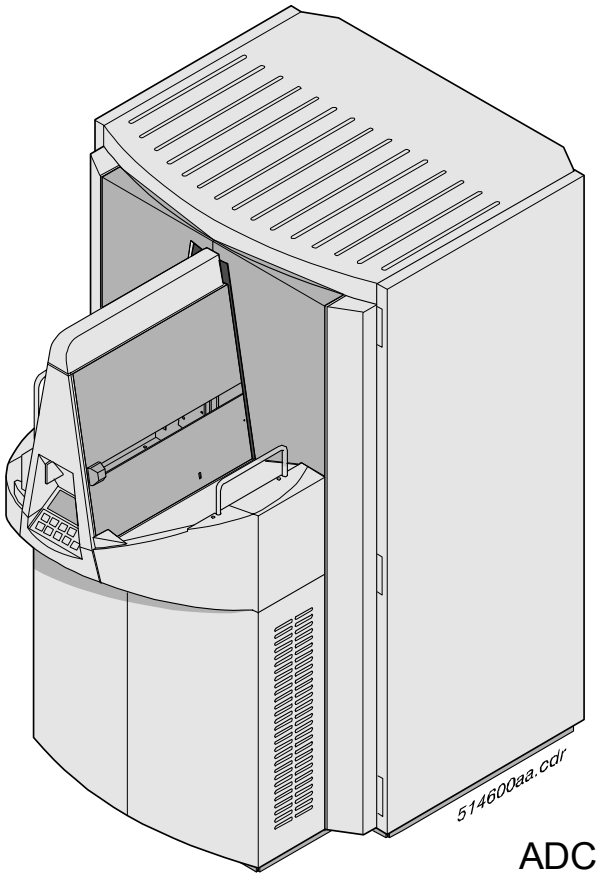
Order-No.: DD+DIS014.02E

1 Piece UT474 MA1

ADC Compact

Type 5145 / 100/101/140
Type 5145 / 200/201/240

4th Edition



ADC Compact
Digitizer
Type 5145 / 100/101/140
Type 5145 / 200/201/240
Base: VME

This documentation is separately available. Order No: DD+DIS014.02E

printed in Germany 01 / 2002

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Caution:

This system uses high voltage. Please consider the respective safety regulations.

These instructions describe adjustments and routines which must only be performed by qualified technical personnel.

Note:

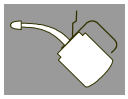
Electrical repairs and connections must only be performed by a qualified electrician.

Mechanical repairs and connections must only be performed by a qualified technician.

CE Declaration:

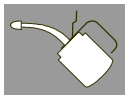
The CE Declaration (CE Conformity) becomes invalid if the product is changed without explicit consent of the manufacturer! This applies to all parts, not only to safety elements.

We reserve the right to technical changes



Section 12:

List of contents



1 Safety

- The ADC Compact has been designed for scanning medical X-ray image plates and should only be used for these purposes.
- The ADC Compact must only be operated by qualified staff trained on the machine.
- Make sure that the ADC Compact is constantly monitored in order to avoid inappropriate handling, especially by children.
- Only trained service personnel must make repairs. Only authorized service personnel must make changes to the ADC Compact.
- If there is any visible damage to the machine casing, do not start nor use the ADC Compact.
- If you want to connect the ADC Compact with other devices, components or assemblies and if the technical data do not permit determining whether the combination with these devices, components or assemblies involves hazards, you must consult the respective manufacturers to avoid danger for operating personnel or the environment.
- Do not override or disconnect the integrated safety features.
- Switch off the ADC Compact before performing any maintenance work or repairs. Disconnect the ADC Compact from the mains before making repairs or performing any maintenance activities.
- As is the case for all technical devices, the ADC Compact must be operated, cared for and serviced correctly.
- If you don't operate the ADC Compact correctly or if you don't have it serviced correctly, Agfa-Gevaert is not liable for resulting disturbances, damages or injuries.
- When installing the ADC Compact, care must be taken to ensure that there is either a mains plug or an all-cable disconnecting device in the internal installation fitted near the ADC Compact and that it is easily accessible.
- If you notice conspicuous noise or smoke, disconnect the ADC Compact immediately.

2 General Information

These maintenance instructions must be considered confidential.

To ensure quality and functional reliability of the system all the points listed below (minimum maintenance points) must be carried out.

- The maintenance points have been arranged in a chronologically suitable order to make the work routines as efficient as possible. The sequence of the maintenance points in the checklist (see appendix) is identical with these maintenance instructions.
- If there is a detailed description for a certain maintenance point in the service documentation, this will be noted in the column "details".
- During the maintenance procedure always consider the safety instructions, see TECHNICAL DOCUMENTATION section 1 / 1.
- Please check if it is necessary to include country specific regulations as additional maintenance points!

Only for Systems with DRA Contract:

In systems with DRA Contract the infocounters are checked and evaluated in regular intervals by the GSC. If there is an indication of an upcoming defect, this is noted in the DRA Report and sent to the respective NSO with instructions for measures possibly required on the machine.

Therefore we recommend to contact your NSO about this subject before maintenance, in order to perform these recommended measures in addition to the "must" maintenance points.

2.1 Maintenance Frequency

The maintenance has to be carried out:

- **every 15.000 cycles** or
- **every 6 month**

2.2 Required Time

approximately 3 h

2.3 Required Tools

Order number	Description
CM+9.5155.1015.2	Cu Filter (for exposure of test images)
Commercially available	Service-PC
Commercially available	Flashlight

2.4 Required Cleaning Material

In addition to the standard equipment, the following cleaning substances are required:

Order number	Description
CM+9.9999.0895.0	Vacuum cleaner
CM+9.9999.0896.0	Dirt bags for vacuum cleaner (10x)
ABC-Code: EFOJH	ADC Cleaner
Commercially available	Dust brush
Commercially available	Lint-free cloth
Commercially available	Soft dust brush

2.5 Required Spare Parts

The following assortment represents a complete copy of the **Maintenance-assortment** (CM+051450100733) according to the **R I M L**-assortment categorization in the spare parts list:

Order number	Description
CM+9.0335.0071.0	2 x Tension Springs (at the rollers of output buffer)
CM+9.0389.6097.0	2 x Toothed belt (at transport unit)
CM+9.0450.6558.0	2 x Erasure lamp, 1000 W
CM+9.0450.6559.0	1 x Erasure lamp, 2000 W
CM+9.5145.9100.0	2 x Roller (at cassette unit)
CM+9.9576.1801.0	1 x Air filter

3 Maintenance Step by Step

3.1 Diagnostics

3.1.1 Questioning of the customer

- Ask the customer for any problem that appeared since the last maintenance

3.1.2 Infocounter Analysis

- Service PC to analyze the infocounter

(1) Insert an empty floppy in the floppy drive of the VME Rack, see Figure 1.
(2) In the service menu select "Save on floppy" with the ▽ key and press ✓
(3) select "Infocounter file" and press ✓
(4) Remove the floppy from the floppy drive and insert it in the Service PC
(5) Unzip the file "5145_xxxx_icn.zip" (xxxx stands for the serial number)
(6) Start an editor (e.g. notepad or wordpad).
(7) Open the file "\D_\infocounter\0\infocounter.txt"
(8) Evaluate the infocounter file.

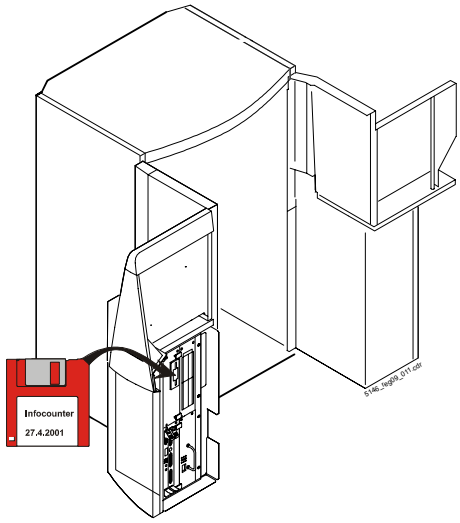


Figure 1

3.1.3 How to evaluate the Infocounter

Evaluation of infocounters.txt	
What to check in the infocounter	**Comment**
1.1 Device Info: Serial number and Installation date	Compare device serial number to section 11 “Technical Standard Modifications” and section 13 “Field Service Bulletins” to determine whether the device is modified or requires a modification.
1.4 Software Info	It is recommended to have the latest software installed. Before you upgrade to a new software, make sure that your hardware is up to date.
2.2 Throughput	For throughput most important are the cycles per day. They usually count between 50 and 200.

Evaluation of infocounters.txt	
What to check in the infocounter	**Comment**
3.3 Hardware Modification History	By comparing the status of the device with the available “Modifications”, section 10, the exact hardware status can be determined.
3.4 Software Modification History	By checking the software modification history it can be determined, whether a recent software upgrade solved a problem, that occurred quite often in the error list.
4.6 Laser Power	If the laser power is under 11 mW, exchange the laser.
4.7 Galvo Monitoring	Check the entries. If the limits of offset (30) or amplitude (60) are exceeded, check the last images on the workstation thoroughly for jitter. Change galvo only if necessary.
5.3 Retries	Many retries (> 1%) have to be investigated: They usually lead to less throughput of the device. Compare it with frequent error codes.
5.7 Error History	Check the last occurred errors (in between two maintenance), how often they appeared as well as the CBF (cycles between failures) of these errors. This gives an overview of the current status of the machine. Compare the frequently occurring errors to the error hit list, section 6.3, and take actions.
5.8 Error List Relatives and 5.9 Error List Total	Troubleshoot these errors with the help of the technical documentation, section 6.3, “Troubleshooting”.

3.1.4 Clear Infocounter

(1) Clear the infocounters to refresh relative counters.

3.1.5 Visual Check

- Flashlight

(1) Check overall condition of the machine – outside and inside – for obvious changes or damage.

3.2 Inside

- Vacuum cleaner
- Lint free cloth

(1) Vacuum the inside of the digitizer and wipe it.

3.3 Cassette Unit

- Dust brush
- Roller (CM+9.5145.9100.0)
- Toothed belt (CM+9.5145.5195.0)

Opener mechanism

(1) Clean the opener mechanism with a soft dust brush.

(2) Check roller (see small circle) for visible wear and replace if necessary.
In any case replace the roller once a year.

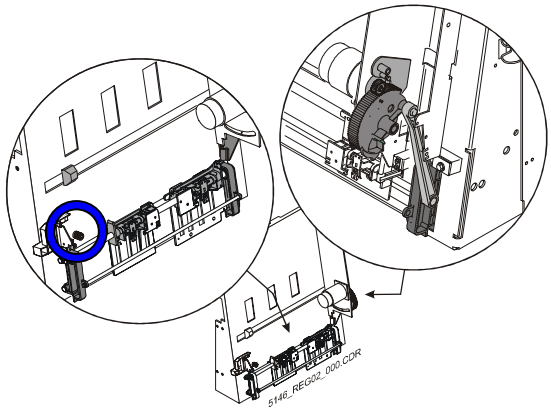


Figure 2

Belt

(3) Exchange the toothed transport belt once a year.

3.4 Power Unit

- Soft cloth
- Air filter (CM+9.9576.1801.0)

Safety switch

(1) Open the doors of the digitizer while the machine is switched on.

(2) As soon as the left door is opened only a little all assemblies must be deenergized.

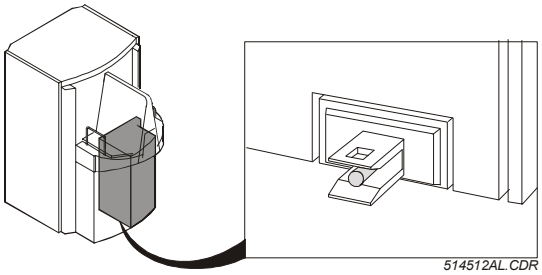
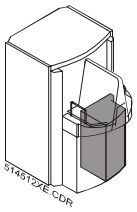


Figure 3

Air filter

(3) Exchange the air filter **1** by opening the cover plate **2**.

Observe the installation position of the filter.



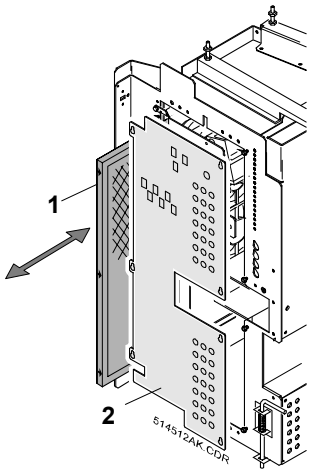


Figure 4

3.5 VME Rack

- Vacuum cleaner
- Soft cloth

VME fan

(1) Check the function of the fan by holding the hand in front of the grid. The fan must blow the air out of the machine.

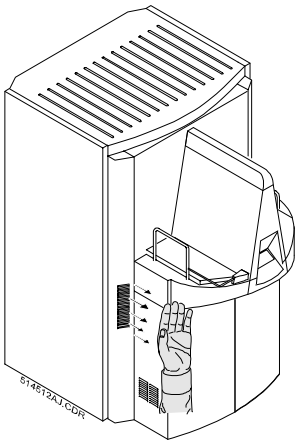


Figure 5

Housing

(2) Clean the VME Rack. Therefore it is necessary to remove the VME Rack.

(3) Unplug the cables carefully, unscrew the mounting screws and take out the VME Rack.

(4) Dust the VME Rack itself, the housing of the rack and all fan-grids.

Handle the cables with care! Danger of damage by unplugging and plugging.

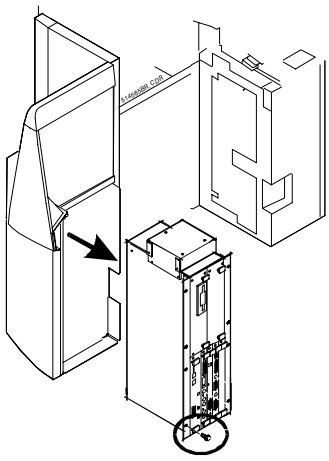


Figure 6

3.6 Scan Unit

- Soft cloth
- ADC Cleaner
  (if not available, use water)
- Discharge brush
  (CM+9.5145.2442.1)

Scan rollers

(1) Slide out the scan unit

(2) Clean the scan rollers on prescan and postscan side with ADC Cleaner.

The scan rollers have to be cleaned in place and must not be removed. To move the scan rollers just turn the drive of the slow scan motor manually.

Discharge brush

(3) Check the discharge brush for visible wear and dirt. If it is very dirty, remove it and clean the brushes **1** in the direction of the bristle - do not bend.

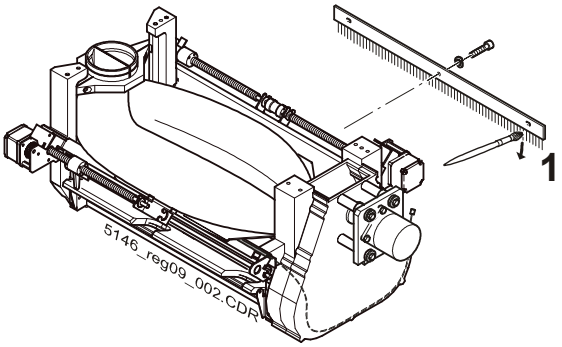


Figure 7

3.7 Transport Units

- ADC Cleaner
  (if not available, use water)
- Suction cups
  (CM+9.5145.6550.0)
- Toothed belt
  (CM+9.0389.6097.0)
- Toothed belt pulley
  (CM+9.5145.6519.1)

Suction cups

(1) Check the suction cups **1** position.

(2) Clean the suction cups with ADC Cleaner.

(3) Exchange suction cups once a year.

(4) In case of vacuum problems, check the suction cups by bending up the edges (check for tears) and replace if necessary.

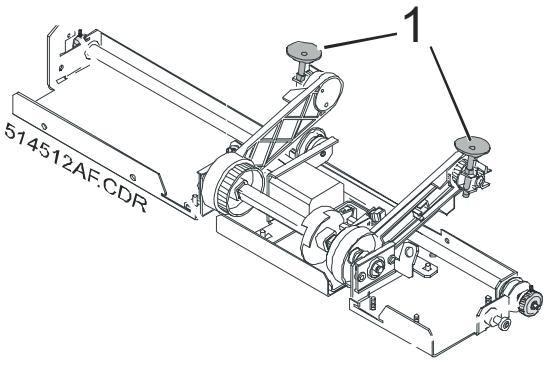


Figure 8

Advanced robot For advanced robot it is not necessary to exchange toothed belts.

Standard robot

(5) Check the outer thooted belt of both transport units for damage and replace if necessary.

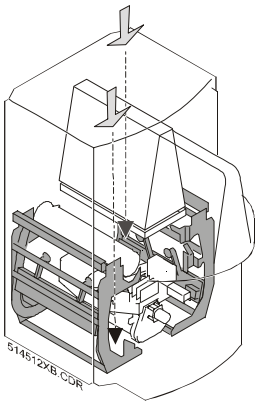


Figure 9

(6) Replace the belt in any case once a year.

(7) Check toothed belt pulley **B** when the belt **A** is removed and replace if damaged.

Adjustment of toothed belt, see Section 6.6.

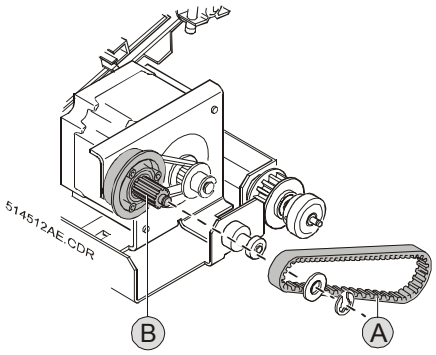


Figure 10

3.8 Erasure Unit

- Soft cloth
- ADC Cleaner (if not available, use water)
- 2 x 1000 W lamps (CM+9.0450.6558.0)
- 1 x 2000 W lamps (CM+9.0450.6559.0)

(1) Remove the complete Erasure Unit by following the sequence and arrows in figure beside.

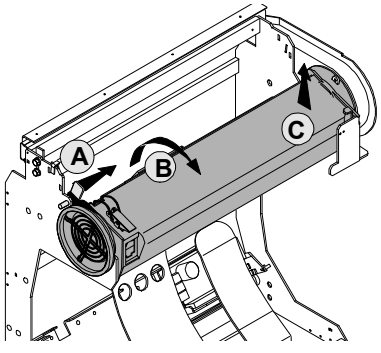


Figure 11

Lamps

(2) Remove the pane **4** (figure 12)

(3) Remove all lamps **1** (figure 12)

Do not lift the spring-loaded contacts by hand otherwise the spring might be stretched too far.

(4) Dust the following parts:
- Reflector
- Input and output opening of the air stream (protection grid) **2** (figure 12)
- Outer front pane **4** (figure 12)
- KG2 filter **3** (figure 12)

In case of persistent dirt, you may also use ADC Cleaner for cleaning all the surfaces with the exception of the inner side of the large glass plate (arrow at **4**, figure 12). This side must not be cleaned with anything wet since a gelatin layer is attached to it.

(5) Check the KG2 filter **3** for damage and replace if necessary.

(6) Check the sockets of the lamps for burn and replace if necessary.

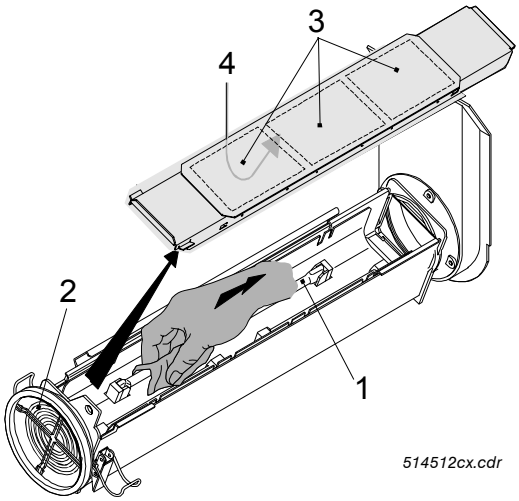


Figure 12

Do not touch the lamps with your bare fingers! Use a soft cloth to insert the lamp.

(7) Re-insert the Erasure unit.

3.9 Cassettes

- Aluminum label (CM+9.8300.1131.0)

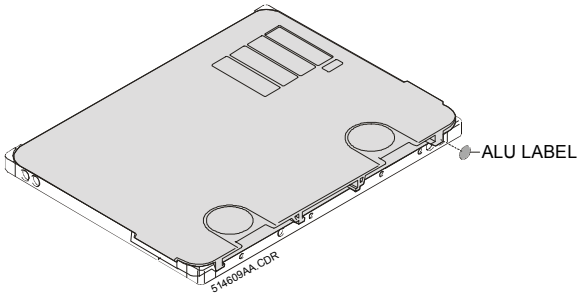
Visual Check

(1) Check cassettes from customers´ “usage counter” (about 5 to 10 cassettes per format) for damage.

(2) Check the most frequently used cassettes and image plates for damage. If damage is noticed, check further cassettes.

(3) Check the following test points of the cassette:
- Outside condition
- Hinges
- Locking
- Opening leaf springs
- Aluminum label

(4) Attach missing aluminum label



The digitizer needs the aluminum label to recognize ADC cassettes.

3.10 Image Plates

Visual Check

(1) Check if there are scratches on the surface.

(2) Check if edges are loose as an indication for mechanical problems at IP transport.

4 Checking the Image Quality

Check the last 20 to 40 images on the VIPS, to see if artifacts or other image quality problems occur.

4.1 Test Cycles

(1) Carry out four test cycles with each format of the cassettes.

4.2 Exposure of a Flatfield

Expose an image plate of every format and evaluate all the images on the Processing Station and a printer. Following, check the flat field for homogenous field or stripes criteria. The hard disk of the digitizer provides two flat field samples for quality comparison.

Repeat this procedure for all formats on site!

- Flatfield

(1) Print the flat field sample provided by the digitizer:

- Start the service program.
- Select from the service menu

```
<Checks>
  <Send flatfield>
    <Calibration pattern>
    <Banding pattern>
```

Print the flat fields "Calibration" and "Banding" via the Processing Station (window setting of 0.6, without changing the level setting).

(2) Expose a new image plate:

- Place the cassette in length direction to the X-ray tube, see figure below.
- Set the following exposure parameters:
  - 7.5 mAs, 77 kVp, 1.3 m distance
  - Doses 10 μGy (result of setting: 7.5 mAs, 77 kVp, 1.3 m distance)
  - 1.5 mm Cu-filter with small focus
- Turn cassette by 180°.
- Expose plate a second time by using the same parameters.

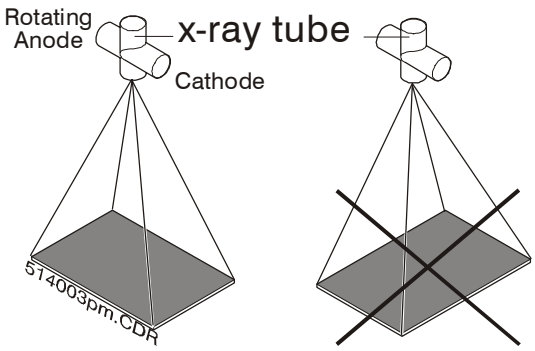


Figure 13

Notice, that all exposure parameters are approximate values.

(3) Identify the cassette on the ID Station:

- In the `<Patient name>` field, type a name and a cassette format, e.g. `Flatfield 18 x 24`.
- In the `<First name>` field, type the serial number of the digitizer, e.g. `SN1356`.
- In the `<Birth date>` field, type the current date, e.g. `20012001` (use date format xxyyzzzz for day/month/year).
- In the **<Radiologist>** list, click **<SERVICE>.**
- In the **<Examination>** list, click **<system diagnosis>.**
- In the **<Sub-examination>** list, click **<Flat field>.**
- Confirm the Exposure class **<200>.**

Make sure that the outlined areas are filled in as shown in the example.

(4) Insert the cassette into the digitizer and print the image on a printer with a window setting of 0.6 without changing the level setting.

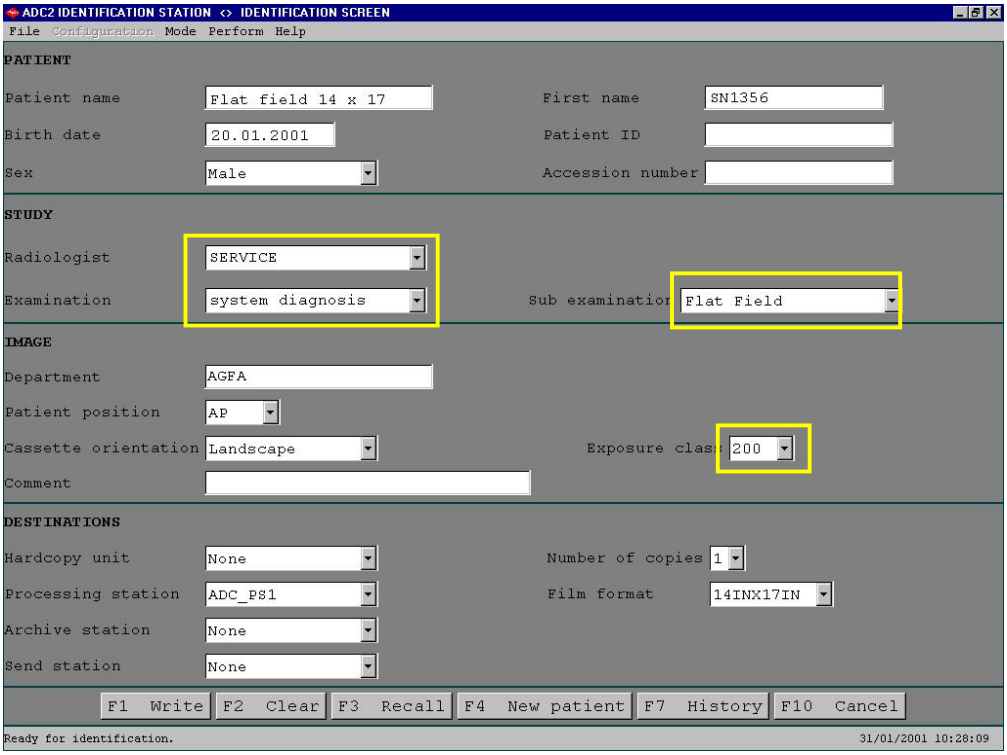


Figure 14

4.3 Evaluation of a Flatfield

(1) Inspect the developed image for homogeneity:

Compare the prints of the flat field sample with your exposed flat field at a light box.

- If there are no lines visible or the effects are less than on the example, the image quality is all right.
- If there are unacceptable effects, compare with the following sketches.

Calibration lines

Blurred dark lines in slow scan direction on the flat field (see beside).

- Check the position of the laser beam via the fiber optics. Expose another flat field and compare it again with the sample.

If there are still unacceptable effects, you have to redo shading calibration as described in section 6.6.

Expose another flat field and compare it again with the sample.

If there are still unacceptable effects, please contact the **Support Center**.

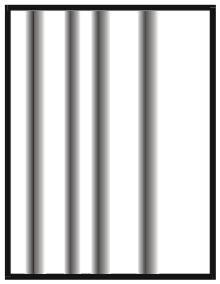


Figure 15

Banding

Fine sharp white or gray lines in fast scan direction on the flat field (see beside).

- Check diagnostic images.

If there are still unacceptable effects please contact the **Support Center**.

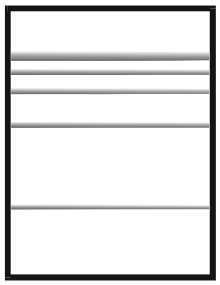


Figure 16

Dust

Fine sharp lines in slow scan direction on the flat field (see beside).

- Check if scanner is dusty. In case of, use the scan-brush to remove it. Expose another flat field and compare it again with the sample.

If there are still unacceptable effects please contact the **Support Center**.

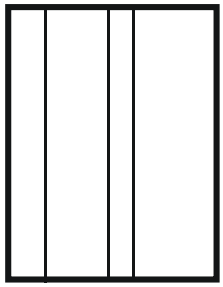


Figure 17

5 Completion of Maintenance

(1) Confirm the maintenance by signing the checklist

(2) Make a backup of the system on floppy

(3) Inform the customer about what was done during the maintenance and which repairs need to be done in next future.

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HealthCare

CSO Customer Support Operations

Maintenance Checklist

Order-No.: DD+DIS014.02E

ADC Compact

Type 5145 / 100/101/140
Type 5145 / 200/201/240

Work Instruction for order no.	SN	Cycles

The maintenance has to be carried out:

- Every 6 months or every 15 000 cycles

Maintenance must be carried out according to the maintenance instructions, see section 12 of your Service Documentation.

Maintenance Step by Step		Done
Diagnostics	• Ask customer about problems	☐
	• Read out the info counters, analyse them and clear them afterwards	☐
	• Check visually the overall condition	☐
Inside	• Vacuum the inside and wipe it	☐
Cassette Unit	• Clean opener mechanism	☐
	• Check roller for visible wear and exchange if necessary	☐
	• Exchange belt once a year	☐
Power Unit	• Check electrical function of safety switch	☐
	• Exchange air filter	☐
VME-Rack	• Check electrical function of the VME-Rack fan	☐
	• Remove dust and dirt	☐
Scan Unit	• Clean scan-rollers with ADC Cleaner (do not remove!)	☐
	• Check discharge brush and clean or replace it if necessary	☐

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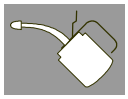
Maintenance Step by Step		Done
Transport Units	• Check suction cups position, clean them with ADC Cleaner and exchange suction cups once a year	☐
	• Check toothed belt and pulley at standard robot	☐
Erasure Unit	• Remove dust from reflector, input and output opening of air stream, KG2 filter, outer front panel	☐
	• Check the KG2 filter	☐
	• Exchange lamps every maintenance	☐
Cassettes	• Check the following items of the cassette: outside condition, hinges, locking, opening leaf springs, aluminum label	☐
	• Attach missing aluminum labels	☐
Image Plates	• Check if there are scratches on the surface	☐
	• Check if edges are loose	☐

Checking the Image Quality		Done
General	• Check the last 20 to 40 images on the VIPS	☐
	• Carry out test cycles, four with each format	☐
	• Print flat field sample provided by the digitizer	☐
	• Expose a flat field	☐
	• Evaluate the flat field and carry out respective actions	☐

Completion of the maintenance		Done
General	• Confirm the maintenance	☐
	• Make a backup of the system on floppy	☐
	• Inform the customer about maintenance and which repairs are necessary	☐



Remarks:

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Date / Signature Service Technician Customer